EPA United States Environmental Protection Agency

U.S. Environmental Protection Agency Region 8 | Montana Office, Helena | July 2001

Milltown Reservoir Sediments Superfund Site:
A Summary of Cleanup Options

What is the Milltown Reservoir Sediments Superfund Site?

The Milltown Dam, built at the confluence of the Clark Fork and Blackfoot Rivers in 1907, acts as a repository for sediment and mining wastes. Sediment from upstream mining activities accumulated in the reservoir, and caused the formation of a groundwater arsenic plume that impacted Milltown's drinking water supply. The reservoir was listed as a Superfund Site in 1983.

The Milltown Reservoir Sediments Superfund Site is divided into three Operable Units: Clark Fork River, Milltown Water Supply, and Milltown Reservoir Sediments. The Clark Fork River Operable Unit is being addressed in a separate cleanup process. The Milltown Water Supply Operable Unit was addressed in a previous response action to install a new drinking water system in 1984. The Milltown Reservoir Sediments Operable Unit is addressed in this fact sheet, and this is the best time for the public to provide input. EPA is encouraging local, state, and federal agencies, industry, and community members to work together to come up with a sound cleanup plan.

How Did It Become a Superfund Site?

Milltown Dam was completed in 1907 to generate hydroelectric power for the sawmill at Bonner, and later, power for Missoula. The dam produces about 3 megawatts of power for the Montana Power Company. Upstream areas were mined for copper and other minerals as early as 1864. A major flood in 1908, and later floods and storm events, transported large quantities of mining and smelting wastes downstream into the reservoir, where much settled as sediment. Over time, more than 6 million cubic yards of sediments have built up behind the dam. Mine wastes in the sediments contain elevated concentrations of metals and arsenic.

Environmental investigations conducted in 1981 by the Missoula City / County Health Department found levels of arsenic in private drinking water wells in Milltown that exceeded federal public health standards. In 1982, EPA became involved and listed the reservoir as a Superfund Site. The Atlantic Richfield Minerals Company (ARCO) was named as a potentially responsible party, and has responsibility to complete remedial investigation and feasibility studies and site cleanup, under EPA's direction. The Montana Power Company is also involved in the cleanup process and implementation.

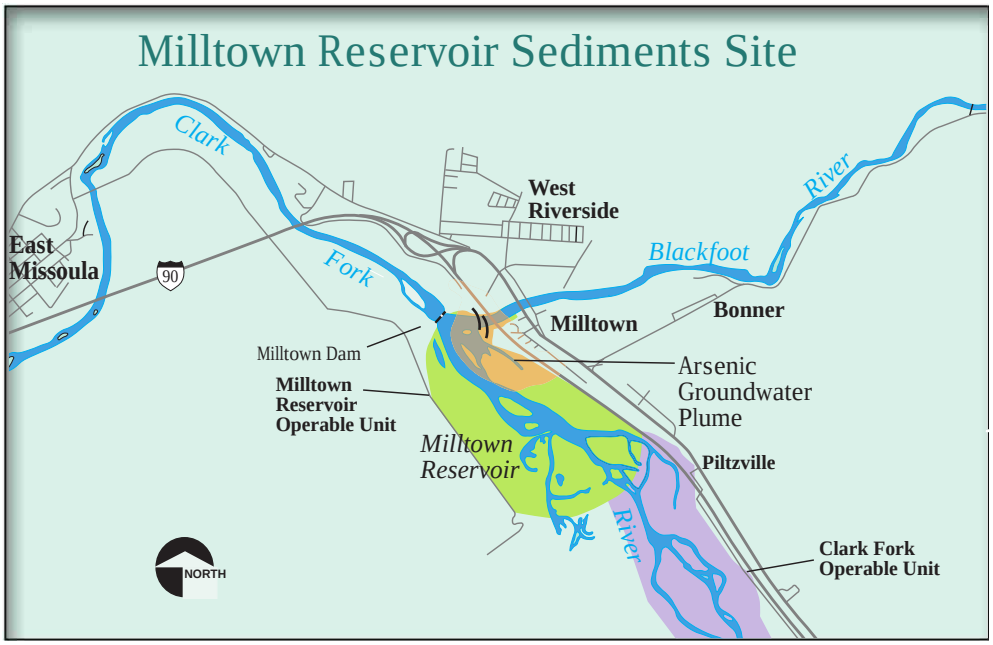
What are the Site Risks?

Human health risks are from arsenic-contaminated drinking water. In an initial response, a replacement water supply was developed for impacted Milltown residents. The Milltown community replacement water supply system was installed in 1984, and is designed to accommodate additional users, if more homes or businesses are developed. Studies of the arsenic plume indicate that the plume boundary has changed very little. Once arsenic enters the groundwater, concentrations decrease rapidly as geochemical reactions bind the arsenic to soils. There are also risks to downstream aquatic life, which occur primarily during ice scour events. In this case, the key metal of concern is copper. Should the dam fail, there is also the risk to aquatic life from the release of contaminants. However, it is the Federal Energy Regulatory Commission (FERC) that determines the chance of the dam failing and imposes all dam safety measures; EPA looks at the risks to human health and the environment *if* such an event were to occur. State water quality standards are often exceeded during various flow conditions The Superfund law encourages the full cleanup of aquifers classified as "usable" by the State.

What Has Been Done So Far?

Between 1982 and 1992, several investigations were conducted in the Milltown area to identify the source and extent of the groundwater arsenic and characterize the soils, groundwater, surface water, sediments, and biological resources in and near the Milltown Reservoir Sediments Operable Unit. This information was published in a Remedial Investigation report in 1995.

Guided by the findings of the Human Health and Ecological Risk Assessments and Applicable or Relevant and Appro-



priate Requirements (ARARs) standards identified for the site, 24 alternatives were evaluated through a process described in the Draft Feasibility Study (FS) Report (ARCO 1996). Just before the FS was completed, a series of unforeseen climactic conditions developed in western Montana. Subzero winter temperatures froze large sections of the rivers; warm Chinook winds followed with a rain-on-snow event that caused the formation of massive ice flows and facilitated their movement downstream. Operators of the Milltown Dam, concerned about ice damage to the flashboard system, rapidly reduced reservoir pool level by 8 feet. Large chunks of ice settled on the sediments in the reservoir. Rising water from the rain event moved the ice, causing it to scour sediments in the reservoir. The increased river flows transported the sediments downstream.

To evaluate the impacts of the sediment release on aquatic life downstream of the dam, an addendum to the original Ecological Risk Assessment was produced by EPA. This addendum demonstrated unacceptable risks to aquatic life during high flow events like the 1996 ice scour event. At the same time, EPA asked ARCO to initiate a supplemental Focused Feasibility Study (FFS) to augment the draft FS. A total of 10 alternatives were examined in the FFS, which was released in June 2001.

What Did the 2001 FFS and the 1996 Draft FS Show?

The 10 alternatives evaluated in the FFS (seven main alternatives with sub-alternatives) ranged from modifying the dam and operational processes to completely removing the dam and sediments. By the end of this preliminary analysis, Alternative 2, Modification of Dam and Operational Practices; and Alternative 7A, Dam Removal and Total Sediment Removal (Lower Reservoir Area), scored most favorably under Superfund's evaluation criteria. It is important to note that at this point, all criteria are considered equally; however, in its final decision, EPA has the authority to give some criteria more weight than others.

Alternative 2 achieved the highest overall score based on EPA's seven criteria for evaluating cleanup actions. This alternative is generally favored by ARCO, Montana Power, and residents living very close to the reservoir (i.e., Bonner area). It meets the threshold criteria (see box at right), scores moderate for long-term effectiveness and permanence, and scores high for short-term effectiveness, cost, and implementability. It also requires significant ongoing operation and maintenance.

Alternative 7A also ranked high in EPA's criteria and is generally favored by the larger Missoula area community, including the local elected officials. It scores high in long-term effectiveness and permanence because it does not require significant ongoing maintenance (the dam and sediment are removed). However, the score for short-term effectiveness was low-moderate because of potential negative impacts on downstream aquatic life during dredging and was rated moderate for implementability. The cost of this alternative was about $100 million higher than Alternative 2. It is important to note that the FFS did not address impacts to groundwater (either cleanup of existing contamination or potential continued releases). These contaminated sediments will be addressed in the final Combined Feasibility Study.

An alternative that also ranked high in the EPA criteria was Alternative 3A, Modification of Dam and Operational Practices with Erosion / Scour Protection. Although this ranked higher overall than Alternative 7A, it is not favored because it adds very little additional environmental protection—but with significant cost increases—over Alternative 2.

The highest scoring cleanup option identified in the draft 1996 FS report was to leave the sediments in place and continue the use of the alternate water supply. This option would have protected human health but would have allowed the contaminated groundwater plume to remain in place forever, thus requiring a waiver of groundwater standards.

What are the Cleanup Options Now?

Two major documents have been generated to evaluate cleanup options:

- Original Draft FS (1996)—evaluated cleanup alternatives for the groundwater plume and addressed human health risks—24 alternatives were evaluated. In response to public requests and the need for additional study (i.e., the FFS looking at ice scour impacts), the 1996 Draft FS was never finalized.
- Focused Feasibility Study (2001)—evaluated the potential for scour and flooding and impacts on surface water quality—10 alternatives were evaluated.

Several alternatives from each document have been selected and combined for further evaluation in the final Combined FS. Now, although the Combined FS is not yet complete, Alternatives 2 and 7A (or variations of these alternatives) are likely to receive the most serious consideration by EPA. These alternatives would protect downstream aquatic life from ice scour events and would also require maintenance of the alternative water supply for some affected area residents (thus, addressing human health concerns). These alternatives offer different advantages and disadvantages. The Draft Combined FS will be released for public comment in September. EPA welcomes—and encourages—you to express your opinion about the cleanup alternatives being considered.

Independent of the Superfund evaluation, which addresses potential contaminant releases only, the dam is also subject to regulation governed by the FERC. Should the dam remain, FERC inspections are required and the dam must comply with any improvements dictated by safety concerns or related

EPA's Evaluation Criteria

Threshold Criteria—Must be Met

1. Overall Protection of Human Health and the Environment—*Must attain a level of protectiveness*
2. Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)—*Includes state and federal regulations; where ARARs cannot be met, a waiver may be considered*

Balancing Criteria—Must be Considered

3. Long-Term Effectiveness and Permanence
4. Reduction of Toxicity, Mobility, and Volume
5. Short-Term Effectiveness
6. Implementablity
7. Capital and Operating and Maintenance Cost

Modifying Criteria—Must Also be Considered

8. State Acceptance
9. Community Acceptance

ecological issues such as fish passage. The Combined FS alternatives include some of these improvements in the description of dam actions. These potential actions are mandated by FERC and are independent of EPA's action. The description of these activities may change as FERC proceeds through its full licensing process.

Cleanup Options to be Considered in the Combined Feasibility Study

Alternative	Action to Dam*	Action to Channel and Floodplain Sediments	Action to Groundwater Plume
1—No Further Action	Safety Upgrade/ Fish Passage	None	Maintain Replacement Water Supply
2A— Modification of Dam and Operational Practices plus Groundwater Institutional Controls (GW ICs)	Safety Upgrade/ Fish Passage/ Inflatable Rubber Dam	None	Maintain Replacement Water Supply Controlled GW Area
2B— Modification of Dam and Operational Practices plus GW ICs and Containment	Safety Upgrade/ Fish Passage/ Inflatable Rubber Dam	None	Slurry Wall, plus actions listed above for 2A
3A— Modification of Dam and Operational Practices with Scour Protection plus GW ICs	Safety Upgrade/ Fish Passage/ Inflatable Rubber Dam	*Channel*: Soft Streambank Stabilization *Floodplain*: Revegetation	Maintain Replacement Water Supply/ Controlled GW Area
3B— Modification of Dam and Operational Practices with Channelization plus GW ICs and Containment	Safety Upgrade/ Fish Passage/ Inflatable Rubber Dam	*Channel*: Limited Sediment Removal/Channelization with Armoring plus Periodic Maintenance Removal *Floodplain*: None	Slurry Wall/Maintain Replacement Water Supply/Controlled GW Area
5—Dam Removal, Partial Sediment Removal with Channelization and Leachate Collection/ Treatment, plus GW ICs and Natural Attenuation within the Aquifer Plume	Removal	*Channel*: Limited Sediment Removal in Channels Armoring *Floodplain*: None	Leachate Collection/ Maintain Replacement Water Supply/ Controlled GW Area (Pump and Treat)
6A— Modification of Dam and Operational Practices with Initial Total Sediment Removal of the Lower Reservoir and Periodic Sediment Removal Thereafter, plus GW ICs and Natural Attenuation in the Aquifer Plume	Safety Upgrade/ Fish Passage/ Inflatable Rubber Dam	*Channel*: Removal *Floodplain*: Total Removal below Duck Bridge	Source Removal/ Maintain Replacement Water Supply/ Controlled GW Area Eventual GW Cleanup Possible
6B— Modification of Dam and Operational Practices with Total Sediment Removal of the Entire Reservoir plus GW ICs and Natural Attenuation within the Aquifer Plume	Safety Upgrade/ Fish Passage/ Inflatable Rubber Dam	*Channel*: Total Sediment Removal of Lower Reservoir *Floodplain*: Total Removal below Duck Bridge	Source Removal/ Maintain Replacement Water Supply Controlled GW Area Eventual GW Cleanup Possible
7A—Dam Removal with Total Sediment Removal of the Lower Reservoir plus GW ICs and Natural Attenuation within the Aquifer Plume	Removal	*Same as 6B, above*	*Same as 6B, above*
7B— Dam Removal with Total Sediment Removal of the Entire Reservoir plus GW ICs and Natural Attenuation within the Aquifer Plume	Removal	*Channel*: Sediment Removal from Entire Reservoir Channel Reconstruction *Floodplain*: Sediment Removal	*Same as 6, above*

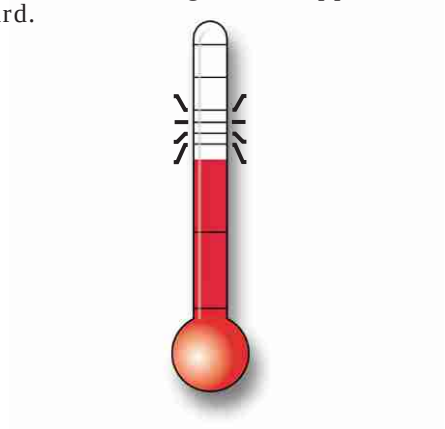
*Dam modifications: upgrading the dam to withstand the probable maximum flood (PMF); installing a fish ladder or performing trap-and-haul for fish passage; and installing an inflatable rubber dam to replace the existing flashboard assembly. It should be noted that all upgrades of the dam for safety reasons or fish passage are dictated under FERC's authority, not Superfund authority. These items (i.e., upgrades, fish passage) have been included in the FS for cost comparison only.
Note: Alternative 4 was eliminated from consideration. The alternative numbers correspond with the Focused Feasibility Study.

How will the Approach be Selected?

EPA's initial evaluation of the FFS alternatives, the highlights of which are described above, is based on the first seven (of nine) criteria. These seven criteria are a mixture of technical, legal and policy concerns, and are known as the Threshold and Balancing criteria. These are criteria that the cleanup plan must meet. EPA has retained nine of these FFS Alternatives, including additional components to address groundwater contamination issues, for further, detailed evaluation. Once these alternatives have been completely developed, EPA will then evaluate them against the same seven criteria—the Threshold and Balancing criteria. The alternative that EPA believes best meets these criteria will be suggested as the final cleanup plan. This Proposed Plan will be available for public comment in September 2001. It is important to note that up to this point, the evaluation has not included state and community acceptance. These are very important considerations. State and local officials, as well as community members, will assist EPA in determining what approach works for the community. EPA will work closely with state and local officials and the community throughout this process. EPA is eager for public input on the Proposed Plan. After careful review and consideration of comments from the state and community, the next step will be to write a Record of Decision (ROD) to document the cleanup plan. Finally, design and construction will implement the selected remedy.

What is the Schedule?

The draft schedule, shown below, is subject to change as the process of determining the best approach for this site moves forward.



How Can I Get Involved?

Through its Technical Assistance Grants (TAG) program, EPA funds the Clark Fork River Technical Assistance Committee (CFRTAC) to review the results of EPA studies and relay them to the community. CFRTAC consists of representatives of various interest groups and citizens at large.

A significant component of alternative selection is state and community acceptance. EPA is working closely with state and local representatives to be sure the selected alternative meets cleanup and community goals to the greatest extent possible. Making your opinion known is important for the cleanup selection process.

Where Do I Find More Information?

For more detailed information, review materials available at the EPA Superfund Records Center or the Public Library. Or, visit our web site at http://www.epa.gov/region08/superfund/sites/mt/milltown.html, or e-mail us at milltown@epa.gov. Interested members of the public are also encouraged to contact the community group, CFRTAC, for additional information or visit their website: clarkforkoptions.org.

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